REMARKS

Claims 1-17 are all the claims presently pending in the application.

Claims 1, 2, and 5 have been amended to define more clearly and particularly the features of the claimed invention. Claims 11-17 have been added to provide more varied protection for the present invention.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicants specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 1-10 stand rejected on prior art grounds. With respect to the prior art rejections, claims 1-5 stand rejected under 35 U.S.C. §102(b) as being anticipated by Shmagin et al. (U.S. Patent No. 5,875,052; hereinafter "Shmagin"). Claims 6-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Shmagin, et al., and further in view of Applicants' Own Admission of Prior Art and Northrup et al. (U.S. Patent No. 6,064,078; hereinafter "Northrup").

These rejections are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

The conventional scintillators, such as the widely used ionic crystal of NaI or CsI have a chemical stability problem in that the ionic crystal deliquesces by absorbing water. In addition, because Tl added as a fluorescence activator is a highly toxic substance, there

is also a problem that Tl has an adverse influence on the human body and the environment (e.g., see specification at page 2, lines 5-11).

In comparison, the claimed invention provides a scintillator that is chemically stable and nontoxic (e.g., see specification at page 2, lines 14-17).

For example, an illustrative non-limiting aspect of the present invention, as defined for example, by independent claim 1, relates to a scintillator including a Group III nitride compound semiconductor, wherein the scintillator is excited by radiation.

In another exemplary aspect of the invention, as defined for example by dependent claim 2, the Group III nitride compound semiconductor can include a layer structure. In yet another exemplary aspect of the invention as defined for example by dependent claim 3, a layer of the Group III nitride compound semiconductor can be formed on a substrate. In another exemplary aspect of the invention, as defined for example by dependent claim 4, a buffer layer can be formed between the substrate and the Group III nitride compound semiconductor layer. In another exemplary aspect of the invention, as defined for example by dependent claim 5, the Group III nitride compound semiconductor layer includes a hetero structure.

In the exemplary aspects of the invention, as defined for example by dependent claims 6-10, a scintillation counter includes a scintillator according to the present invention.

II. THE PRIOR ART REJECTIONS

A. Claims 1-5 stand rejected under 35 U.S.C. §102(b) as being anticipated by Shmagin. The Examiner alleges that Shmagin teaches the claimed invention.

Independent claim 1 recites "*[a] scintillator comprising: a Group III nitride compound semiconductor, wherein said scintillator is excited by radiation.*" Applicants note that a "*scintillator*" ordinarily is defined as "*a substance that glows when hit by high-energy particles or photons*" by The American Heritage® Dictionary of the English Language: Fourth Edition, © 2000 (emphasis added).

The claimed invention, as defined for example, by claim 1, is directed to radiation scintillation. That is, a scintillator according to the exemplary aspects of the claimed invention is excited by radiation (e.g., γ-rays, X-rays, or Cu-Kα-rays) so that a scintillator counter of the present invention can detect such radiation (e.g., γ-rays, X-rays, or Cu-Kα-rays) (e.g., see specification at page 1, lines 9-12).

The Examiner alleges that Figure 3 of Shmagin discloses a scintillating material for use in an optical information storage system and that the scintillating material includes a single heterostructure 12' of a Group III nitride semiconductor material-V semiconductor material (e.g., see Shmagin at column 5, lines 13-15). The Examiner takes the position that the "*scintillation*" is demonstrated by luminescence of the hetero layer when illuminated with a UV light source, as allegedly shown by Shmagin at column 4, lines 60-62.

That is, although Shmagin does not explicitly state that the disclosed structure is a "*scintillator*" (indeed, Shmagin does not even use the term "*scintillator*" anywhere in the disclosure), the Examiner alleges that Shmagin discloses a heterostructure 12' of a Group III nitride semiconductor material-V semiconductor material which allegedly acts as a "*scintillator*" by demonstrating luminescence of the hetero layer when it is illuminated with a UV light source (e.g., see Shmagin at column 4, lines 60-62).

Specifically, Figure 3 of Shmagin discloses a single heterostructure 12' including a substrate 32, which is preferably a sapphire substrate, and a buffer layer 34, for example a 1.5 μm thick GaN layer, on the substrate 32. A ternary Group III-V Nitride semiconductor material layer 36, for example a layer of InGaN about 0.6 μm thick, is included on the buffer layer 34 opposite the substrate 32.

Shmagin discloses that a line was written on the heterostructure using a laser, which resulted in a bright, high contrast line on the heterostructure. Shmagin discloses that the sample was left under room lights at room temperature and that it was seen that the visible contrast between the written pattern and the unexposed area diminished with time. At the end of four hours, the lines were barely visible and were considered erased. After approximately eight hours at room temperature, no lines were visible and the sample appeared to be complete restored to its original state (e.g., see Shmagin at column 7, lines 9-18).

Thus, in contrast with the claimed invention, Shmagin discloses that the UV light source causes the heterostructure to emit light, not that the heterostructure is excited by radiation.

Applicants respectfully submit, however, that Shmagin does not disclose or suggest a scintillator which is excited by radiation, as claimed by Applicants.

For the foregoing reasons, Applicants respectfully submit that Shmagin does not disclose or suggest all of the features of the claimed invention, and therefore, respectfully requests that the Examiner withdraw this rejection.

B. Claims 6-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Shmagin in view of Applicants' Own Admission of Prior Art (AOAPA), and further

in view of Northrup. Applicants submit, however, that there are elements of the claimed invention which are not disclosed or suggested by Shmagin, AOAPA, and Northrup, either individually or in combination.

Moreover, Applicants submit that, even assuming *arguendo* that Shmagin, AOAPA, and Northrup disclose the individual elements of the claimed invention, it would not have been obvious to combine the cited references in the manner alleged by the Examiner. Indeed, Applicants respectfully submit that the Examiner has not properly established a *prima facie* case that the ordinarily skilled artisan would have been motivated to make such a combination.

For example, the Examiner alleges that it would have been obvious to combine Shmagin, AOAPA, and Northrup to arrive at the claimed invention, as defined by claims 6-10, which recite, *inter alia*, "*[a] scintillation counter including a scintillator*" according to claims 1-5, respectively.

The Examiner takes the position that Shmagin allegedly discloses a "scintillator", as described above with respect to claim 1. However, the Examiner acknowledges that Shmagin does not disclose or suggest a scintillator counter including the alleged "scintillator". Instead, the Examiner acknowledges that Shmagin merely discloses a device for optical information storage including the alleged "scintillator" (i.e., the heterostructure of Shmagin).

To make up for the deficiencies of Shmagin, the Examiner notes that Applicants' alleged Admission of Prior Art (i.e., the "Background" section of the present application) discloses that a scintillation counter includes a scintillator in order to convert incident radiation to a more easily detectable fluorescence. Further, the Examiner alleges that

Northrup discloses that Group III nitride semiconductors are especially desirable for strong chemical bonding which makes them highly stable and resistant to degradation.

That is, the Examiner takes the position that, because scintillators (e.g., scintillators which use ionic crystal of NaI or CsI and have a chemical stability and are highly toxic to the human body and the environment, as disclosed by the "Background" section of the present application, at page 2, lines 5-11) are known in the art, then it would have been obvious to use the alleged scintillator of Shmagin in a scintillation counter because Northrup discloses that Group III nitride semiconductor materials are stable and resistant to degradation (and thus, allegedly would be known to be more stable than common scintillation crystals).

Applicants respectfully disagree with the Examiner's position, for several reasons.

Applicants submit that the Examiner clearly has not properly established a *prima facie* case that the ordinarily skilled artisan would have been motivated to make such a combination, in view of Shmagin and Northrup, either alone or in combination, absent the benefit of Applicant's own disclosure.

Applicants note that there are three sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art (e.g., see M.P.E.P. § 2143.01, citing *In re Rouffet*, 149 F.3d 1350, 1357 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998)).

Turning to the cited references, Applicants note that a word search of Shmagin and Northrup clearly shows that neither of these references discloses, suggests, or even mentions a scintillator, or for that matter, a scintillation counter.

In fact, Shmagin merely relates to optical information storage systems which use heterostructures including ternary Group III-V nitride semiconductor materials. On the

other hand, Northrup merely relates to the formation of Group III-V nitride films on sapphire substrates with reduced dislocation densities.

However, Shmagin and/or Northrup clearly do not disclose, suggest, or even mention the problems with scintillators which are disclosed and addressed by Applicants in the present application. Indeed, as mentioned above, neither Shmagin nor Northrup discloses, suggests, or even mentions a scintillator, or a scintillation counter, at all.

In fact, the Examiner has not even cited a reference showing the claimed element of a "*scintillation counter*". Thus, Applicants respectfully submit that, as a matter of law, the Examiner has not established a *prima facie* case of obviousness with respect to all of the recited elements of the claimed invention.

As mentioned above, the Examiner merely relies on Applicants' own disclosure of the problems with conventional scintillators as the motivation for combining the disparate references, Shmagin and Northrup, with the claimed invention itself, to arrive at a scintillation counter, according to the claimed invention.

Thus, Applicants respectfully submit that the Examiner clearly is using impermissible hindsight based reasoning to establish a motivation for combining Shmagin and Northrup to arrive at the "*scintillation counter including a scintillator*" "*comprising a Group III nitride compound semiconductor*", as recited in claims 6-10. That is, Applicants submit that Applicants' own teachings cannot properly be used against Applicants in order to establish the obviousness of Applicants' own invention.

Applicants also submit that, in the "Background" section of the present application, Applicants clearly did not state that the problems with the conventional devices were known in, or even addressed by, the prior art. Instead, Applicants merely identified the problems with the conventional devices in the "Background" section of the

application, and then disclosed Applicants' novel and unobvious solutions for addressing the problems of the conventional devices in the "Summary" and the "Detailed Description" sections of the application.

For the foregoing reasons, Applicants respectfully submit that there clearly are elements of the claimed invention which are not disclosed or suggested by Shmagin, AOAPA, and Northrup, either individually or in combination. Moreover, Applicants submit that, even assuming *arguendo* that Shmagin, AOAPA, and Northrup disclose the individual elements of the claimed invention, it would not have been obvious to combine the cited references in the manner alleged by the Examiner because the Examiner has not properly established that that claimed invention would have been obvious, absent the benefit of Applicants' own disclosure.

III. NEW CLAIMS

New claims 11-17 are added to provide more varied protection for the present invention. Applicants submit that claims 11-17 are patentable over the cited references for somewhat similar reasons as those set forth above, as well as for the additional features recited therein.

IV. CONCLUSION AND FORMAL MATTERS

The Office Action objects to the specification for numerous reasons. Particularly, the Examiner objects to the Abstract and the Title of the invention as failing to describe the disclosure sufficiently. Applicants have made minor amendments to the specification and claims to obviate these objections.

In view of the foregoing, Applicants submit that claims 1-17, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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